ELECTRONIC FUNDAMENTALS

SERVICE PRACTICES 4

HOW TO INSTALL A RADIO RECEIVER

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Service Practices 4

INTRODUCTION

Installation is the setting-up, in the customer's home, place of business, or some other place chosen by the customer, of radio, phono, or TV equipment by a serviceman sent by the dealer, the distributor (wholesaler), or the manufacturer. Such an installation is made because of one or more of the following reasons:

1. The equipment is large or heavy and requires special handling.

2. Setting up the equipment is too difficult for anyone but a trained technician.

3. The equipment needs special wiring that the customer cannot be expected to do himself.

4-1. THE INSTALLATION

Most of the radio receivers and phono-radio combinations sold today require no special installation. The customer buys a set, takes it home, plugs it in to a convenient electric outlet, and it plays for him. However, some radio receivers, high-fidelity radio combinations, and phono-radios require installation by a technician sent by the dealer. Television sets also sometimes require installation by a technician. While there are not many such installation calls made today, it is important that you, or any man who plans to do radio service work, should know what should be done when such a call is on the day's program.

One very important reason that a man should be prepared to do a first rate job on an installation call is the greater margin of profit that usually results from the sale of equipment that requires installation.

Another important reason is that the customer may damage such equipment if he attempts to install it himself. When this happens, the customer may either want to return the equipment and get his money back, or he may demand that the dealer send his serviceman to make a proper installation without charge. (Most radio and phono equipment parts are guaranteed by the manufacturer for ninety days. The dealer passes this guarantee on to the customer. The dealer may also include a ninety-day free-service warranty as part of the agreement made at the time the equipment is sold). The fact that the customer may have damaged the equipment himself does not interest him. All he knows is that he was promised free service and he's going to get it – or else.

In any case, the installation by the customer will prove costly to the dealer, and he may still end up with a dissatisfied customer.

Types of Installation. In some cases, the installation is simple. All that is needed is to deliver, unpack, and connect the set in a place chosen by the customer. For example, some standard radio receivers are placed in consoles (cabinets that rest directly on the floor), as shown in Fig. 4-1. In other cases, the job may be a little more difficult. Console models of phono-radio combinations require more operations to unpack and set up than a simple radio receiver. High-fidelity (Hi-Fi) equipment may require a custom installation in specially made cabinets, in bookcases, or in some special furniture that the customer may select. (Special instructions for the installation of Hi-Fi equipment are given in later Service Practices booklets.

Antennas and Equipment Location. Because most radio receivers and some TV

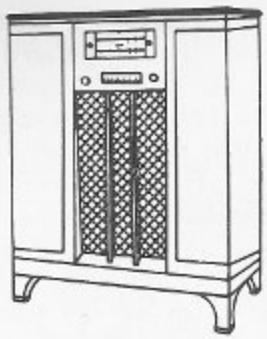


Fig. 4-1

sets are designed with built-in antennas, the ordinary installation of a radio receiver, phono-combination, high-fidelity combination, and some TV sets requires only unpacking the equipment, setting it up, and placing it where the customer wants it. However, there are times when placing the equipment according to the customer's wishes may prevent the best reception of radio signals. In such cases, the customer must be told of the reasons for possible poor reception and shown how improved reception might result from another arrangement.

Courtesy and Thoroughness. No visit does more than the installation call to cement good relations between the customer and the dealer and his service department. A good job and a satisfied customer on this first call can establish good will and pave the way for future sales of equipment to the customer's family and friends. On the other hand, a slight scratch on a console cabinet, an unexplained noise picked up by the radio, a discourteous remark, or any of many other seemingly minor things can be built up into expensive, troublesome, and time-consuming headaches before the customer is satisfied. Sometimes nothing ever overcomes a bad impression made on the first visit. Don't take these statements lightly, or you or your employer may lose customers.

4-2. PREPARATION

Operation of the Equipment. Before making an installation call, find out all that you can about the operation of the radio receiver, phono-combination, or TV set to be installed. Carefully read any unpacking and installation instructions that the manufacturer sent with the equipment. If a similar model is on display in the dealer's showroom, check it carefully. Make sure that you know what each of the control knobs is supposed to do. Tune in stations on several parts of the broadcast, FM, or TV band. Try out each feature of the demonstration model so that you will be able to judge whether or not the customer's model operates correctly after it has been installed in his home. Remember that some manufacturers feature high sensitivity and distance pickup, while others stress fidelity or some other quality.

If the customer has purchased a radio-phono combination, as shown in Fig. 4-2, check the demonstration model to see how switching is made from radio to phono and what controls operate in this phono position. If it has an automatic changer, read the instructions carefully so that you may be able to explain them later to the customer. Carry at least one phonograph test record for each speed that the phono section plays so that you may demonstrate to the customer that the phono turntable operates at the correct speed for each of the records and that the automatic changer operates correctly.

Fig. 4-2

On a television set, familiarize yourself with the picture, size, and linearity controls. Read the operating instructions and the service manual.

When installing a radio receiver, radio-phonograph combination, or TV set purchased by the customer from a mail-order house, you probably will not be able to read the manufacturer's instructions or know much about the receiver until you actually see it in the customer's home. However, if possible, always try to see installation instructions and the equipment to be installed before visiting the customer's house. Then, you will be in a much better position to convince the customer that you know what you are talking about when you speak about the equipment you are installing.

Before making the installation call, it is also necessary to know something about the day and night radio and TV reception. In some areas, the quality of reception varies from neighborhood to neighborhood, and in some cases it varies considerably in different parts of the same house. You should know which stations are received well locally, with little interference. Some stations are almost free of interference. Also note, the stations that are liable to cause trouble because of noise, fading, or interference from some other station. By knowing these things, you are in a better position to judge the performance of the customer's receiver.

If you are working for a store, the owner can give you this information. If you work for yourself, get friendly with some of the local servicemen. You can learn a lot from them about local conditions.

The Customer's Electric Power. In the United States, the three types of electric power that you are most likely to find are: 120-volt, 60-cycle a-c; 120-volt, 50-cycle a-c; and 120-volt d-c power. There are other types, but there are so few instances of their use that we need discuss only the three kinds mentioned above. Of these three types, you will find the first type most often. (The voltage may actually vary between 100 and 130 volts, according to the location of the customer's home.) For this reason, most power-operated electrical equipment in the United States is designed to be used on 120-volt, 60-cycle a-c power. If you know that the customer has 120-volt, 60-cycle a-c power, because this is the only power available locally or in your area, then you have no problem. If equipment is made for a.c.-d.c. operation, you need not worry about which of the three types of power the customer has.

There are, however, some localities where different types of electric power are found. For example, if you live in a town or city where the older buildings have d-c and the others have a-c power, or if you live in an area where each man may have his own electric power system, it is important for you to know what kind of power the customer has. Usually, in areas where there are differences in power, the customer is asked what kind of power he has at the time the sale of radio or TV equipment is made. However, if this information was not learned at the time the sale was made, it is important that you find out what kind of power the customer has before the delivery and installation. In some cases, this may be done by phoning the business office of the electric power company and asking what kind of power is supplied to the building in which the set is to be installed. Most electric power companies are glad to cooperate in this matter. In other cases, you can find out by asking the customer directly. If the customer does not know, it usually pays to make a quick trip to the customer's house to test the kind of voltage the customer has.

Here's why it pays. If equipment designed for operation on 120-volt, 60-cycle a-c power were connected to 120-volt, 50-cycle a-c power, certain parts might get too hot during operation and cause trouble. Furthermore, if the equipment were to include a phono player or a phono changer, the turntable would not turn fast enough to play records properly. As a result, a violin might sound like a cello, and a contralto might sound as if she were singing tenor. If the same equipment is connected to 120-volt, d-c power, the equipment will

not operate at all; and certain parts may burn out and, in some cases, even start a fire.

How to Identify the Kind of Power. It is not always easy to identify exactly what type of power the customer has. It is easy to tell d-c from a-c power. The easiest way is by using a little neon tester, as shown in Fig. 4-3*a*, which you can buy in hardware, radio, and automotive-supply stores. Inside the tester is a neon bulb. (A neon bulb was sent to you in Kit 2.) Inside the neon bulb each of the wire leads connects to an upright electrode. When the two prods of a neon tester are inserted in an electric outlet, as shown in Fig. 4-3*b*, and there is a glow around only one of the electrodes, you may be sure that the power is d-c and that the glowing electrode is connected to the negative side of the power line. If, however, as in Fig. 4-3*c*, both electrodes glow evenly, you may be sure that you have an a-c voltage supply. The brightness of the glow is some indication of the amount of voltage – the brighter the glow, the higher the voltage.

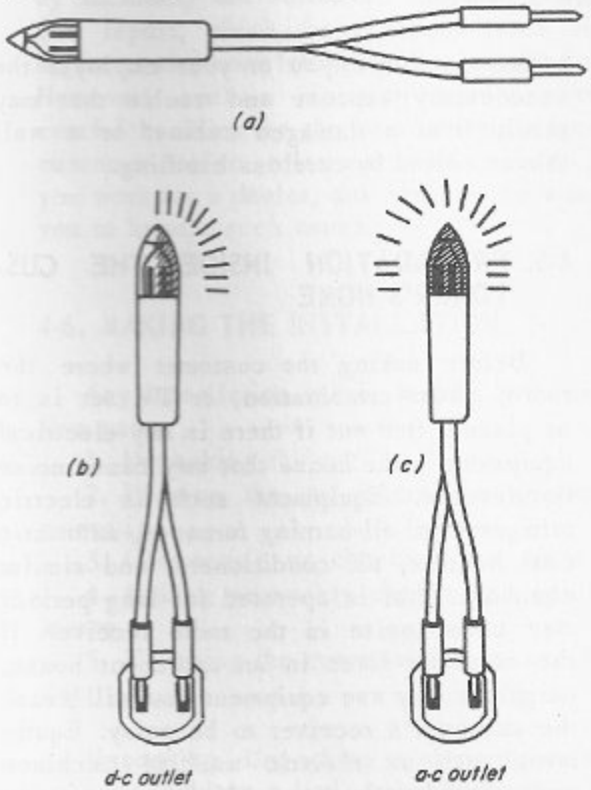


Fig. 4-3

It is not possible, however, to tell the difference between 50- and 60-cycle a.c. in this manner. In fact, there is no easy way of telling. One possible way would be to carry a small a-c phono-player and a test record that you are familiar with. You might plug in the test player and try the record. You could tell immediately by the sound of the reproduction of the record whether it is being played at the proper speed or at the slow speed of 50 cycles a.c.

4-3. PREPARATION OUTSIDE THE CUSTOMER'S HOME

Before entering the customer's house, look around the immediate neighborhood for any possible sources of noise interference. Look for:

1. Overhead power lines
2. Power-line-transformer boxes mounted on poles
3. Telephone or telegraph lines
4. Neon or flasher signs
5. Doctors' or dentists' offices
6. Other places where electrical equipment is likely to be a source of noise

(Later Service Practices booklets discuss noise sources more completely)

If the locality or the particular receiver purchased by the customer calls for an antenna, look for the most likely places where one may be erected. Also note the most likely path for bringing the antenna lead into the customer's house. By making this preparation, you will be more able to discuss the installation with the customer and you will be less likely to promise the customer something that you will later find you can't do.

4-4. DELIVERING THE RADIO, PHONO COMBINATION, OR TV SET

If you make the delivery at the same time that you make the installation call, take someone with you to help you unload and unpack the receiver. As a rule, it is not good policy to depend upon getting help locally, either from the customer or from a

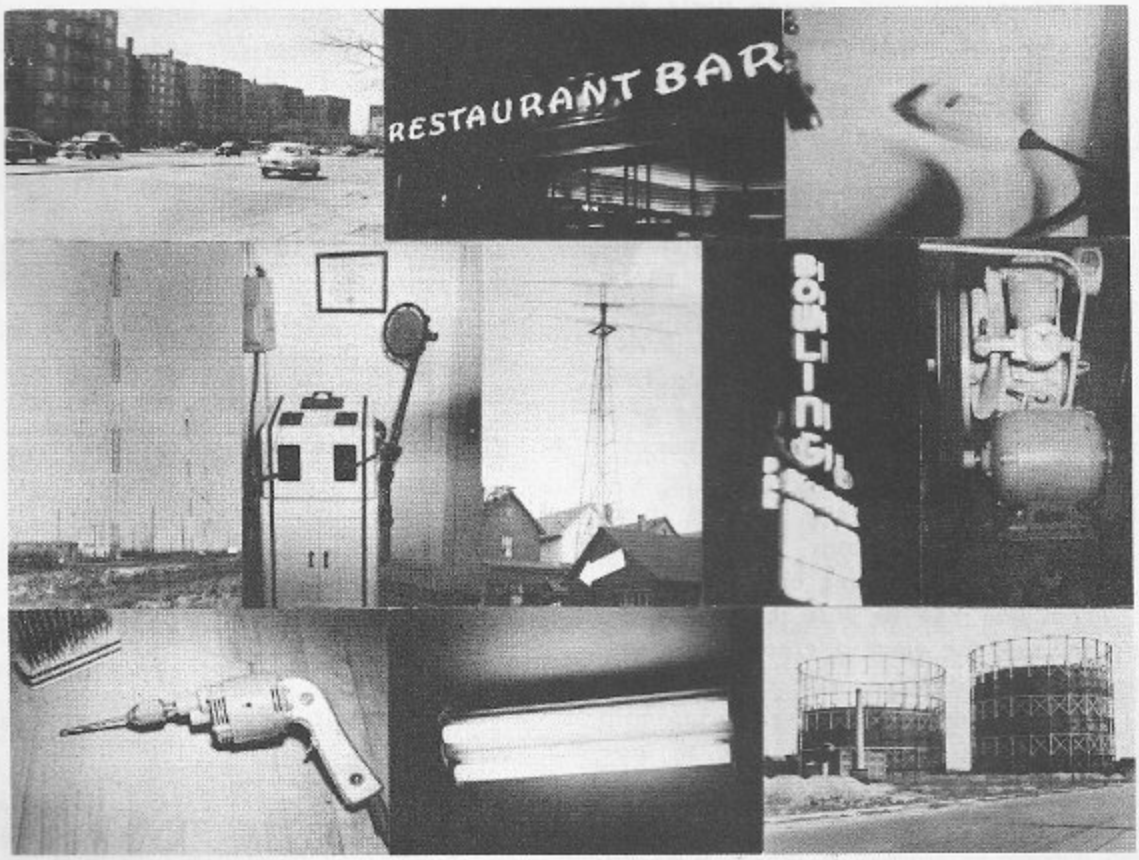


Fig. 4-4. Sources of Noise

neighbor. Before unloading, find out if the customer is at home and which entrance the customer wishes you to use. In towns and cities, the building management of large apartment houses may require you to use the service entrance. If the set is delivered in a large carton or wooden crate, the customer may prefer to have you unpack it outside the house if weather permits. In most cases, this is a good idea. Just make sure to clean up so that you leave no loose packing material around the customer's house. When a large cabinet is unpacked, it is very easy to damage the legs, sides, front, or top surfaces. It is necessary to take great care not to scratch or mar the cabinet, the customer's woodwork, or walls when carrying the radio into the house or apartment. Therefore, it is a very good idea to wrap a large protecting quilt, such as furniture movers use, around the cabinet.

Special care used when making the delivery and carrying the cabinet into the house may save you or your employer the unnecessary expense and trouble that may result from a damaged cabinet or a wall that is marred by careless handling.

4-5. PREPARATION INSIDE THE CUSTOMER'S HOME

Before asking the customer where the radio, phono-combination, or TV set is to be placed, find out if there is any electrical equipment in the house that may cause noise interference. Equipment such as electric refrigerators, oil-burning furnaces, automatic coal heaters, air conditioners, and similar equipment that is operated for long periods may cause noise in the radio receiver. If the customer lives in an apartment house, neighbors may use equipment that will cause the customer's receiver to be noisy. Equipment such as electric washing machines and electric shavers, which are usually operated for only short periods of time,

is not an important source of noise. Explain to the customer your reasons for asking for this information and how it affects the best possible placing of the radio receiver. In some cases, a special antenna may be necessary to reduce the effects of local noise-making equipment. (Service Practices 5 tells how to install simple antennas.)

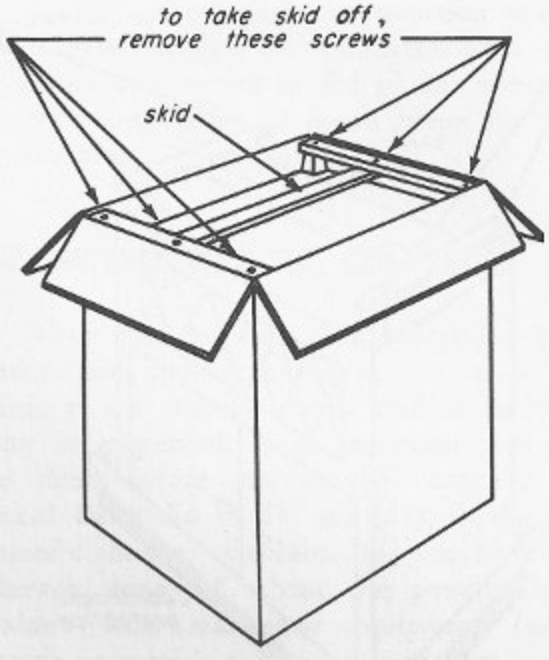
Ask the customer where he desires to have the receiver placed. If his choice of place is good, your installation problems should not be important. However, if the choice is poor because of some possible noise source or because of the problem of an antenna installation, explain to the customer just what difficulties his choice has caused and suggest other possible locations for the equipment. Talk the matter over politely with the customer, but if he insists on his first choice, there is nothing you can do but install the receiver there. In such cases, some dealers and servicemen require the customer to sign a statement to the effect that the customer chose the position even after he had been told that it was not best for reception. This is usually done by including the statement on the installation report, which the customer reads and signs at the completion of the installation. However, such a situation requires very careful handling by the serviceman, or poor customer-dealer relations will result. If you work for a dealer, ask him how he wants you to handle such cases.

4-6. MAKING THE INSTALLATION

Any installation can be broken down into five parts:

1. Unpacking the set
2. Placing the set where the customer wants it
3. Connecting or checking the antenna
4. Making necessary checks and adjustments
5. Teaching the customer how to use the set

Unpacking. Unpacking a shipping carton or case requires a little know-how and a lot of care. Because such cartons are usually large, they require a lot of handling room; unless you are careful, you can accidentally tip over a table, lamp, or some other piece of furniture as you swing the carton into position for unpacking. Most radio consoles are fastened by nails or screws to *skids* (lengths of board). Usually, it is best to remove skids while the set is still in the shipping box. For this reason, it is necessary to turn a shipping carton upside down before opening it. When you open the bottom covers, as shown in Fig. 4-5, be careful not to push a pry bar or a heavy screwdriver into the bottom of the carton; you may accidentally scratch or mar the lower part of the cabinet. When opening a wooden packing case, it may be necessary to remove the front, rear, and sides before you can remove the bottom. Figure 4-6 shows a case opened in this way. Consoles are packed in many ways, and sometimes you have to stop and think of the best way to unpack a particular shipping case.



shipping carton upside down showing bottom of cabinet and skid

Fig. 4-5

Remove the screws or nails that hold the skids to the legs of the console before you turn the console right side up. When turning the console upright, be careful that you do not damage the customer's furniture

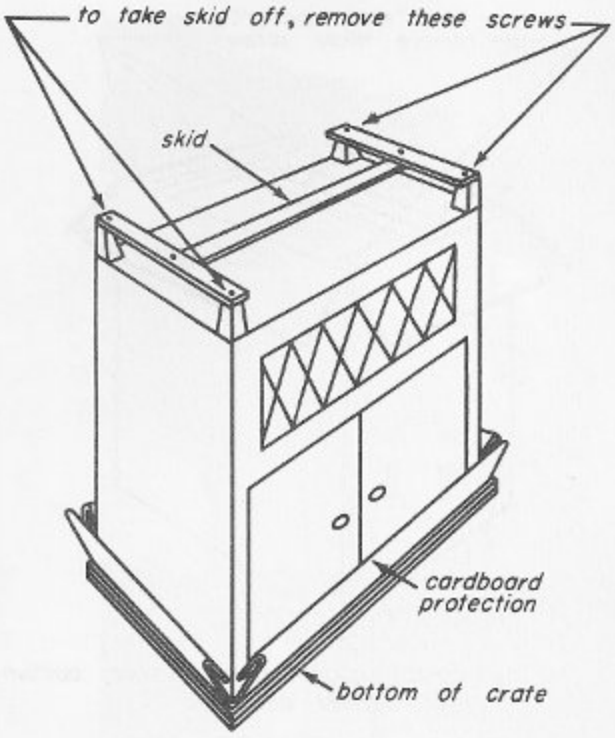


Fig. 4-6

or the tubes and other equipment inside the console. Never slide a console cabinet around the room, whether it is mounted on skids or not. Always lift a cabinet and carry it where it is going.

Most cabinets contain special shipping bolts to hold the parts in tightly. To prevent damage, phono-radio combinations that have built-in record changers are shipped with each record changer bolted down tightly to cabinet or phono-changer shelf. The pick-up arm (that's the arm in which the needle is held) is usually fastened to a support with a clamp or a rubber band. Read the manufacturer's installation instructions before you loosen any screws holding parts in the cabinet.

Place your tools and tool-bag on a *drop cloth* so that you don't damage the floor of the customer's house. A drop cloth, as shown in Fig. 4-7, is a piece of soft cloth that prevents tools and parts from scratching up floors or dirtying rugs.

The Electric Outlet. The electric-power outlet should be close to the place where

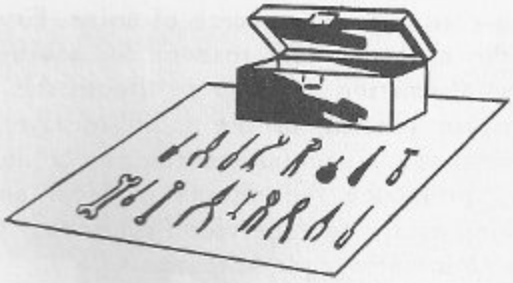


Fig. 4-7

the receiver is to be installed. When the radio power cord is unrolled, it should reach the power outlet with sufficient slack. Then the console may be moved out from its position for examination without pulling the plug out of the electric outlet. If the power cord from the receiver does not reach the outlet, do not lengthen it by adding wire to it. The type and length of the power cord meet standards set by the National Board of Fire Underwriters' Codes. You violate these codes when you add extra wire. So don't do it! If the power cord will not reach the power outlet, either the position of the set must be changed to a place convenient to the outlet or the customer must have an outlet installed by an electrician.

Do not install an outlet yourself unless you are a qualified electrician. Otherwise, you or the dealer you work for may find yourselves in hot water. Here's why. The installation of electric power wiring in most homes and other buildings in this country must meet the standards set by the codes of the National Board of Fire Underwriters and by the local codes and ordinances. If you install electric-power wiring or extend power cords that do not meet the requirements of all of these codes and ordinances, you may void any fire insurance the customer has that covers his home and belongings. This means that if the customer should have a fire after you make an improper installation, you and the dealer you work for may find that you are legally responsible for the fire losses suffered by the customer. So, keep the electric wiring legal; don't extend power cords, and don't install "convenience" outlets.

Checks and Adjustments. Before plugging

the radio receiver, phono-combination, or TV set into the electric outlet, check the back of the console to make sure that all of the tubes are in place and that the built-in antenna is connected properly. In the case of phono-radio combinations, be sure that the connections between the chassis and the phono pickup and motor are in order. On a TV set, make sure that the high-voltage lead to the picture tube is connected and that the picture tube itself is connected. At this time, inspect the chassis, the cabinet, and the phono turntable for any missing parts or obvious defects. It is not always advisable to call the attention of the customer to missing parts or defects, unless, of course, you know that the missing part or defective part will prevent the equipment from playing properly. However, it is necessary to make a note of it on your installation report form. If you do not have such a form, make one on a separate sheet of paper so that the dealer can make the necessary corrections. When the defective part will prevent the radio or phono-radio combination from playing, or if the cabinet defect cannot be easily fixed, the dealer should be notified as soon as possible. This may require using the customer's phone. We will speak more about phones, shortly.

If, however, everything is in proper order, plug the set into the electric outlet. If there is a phono changer or player, check its operation, using your test records, with the volume control all the way down. Always try to avoid using customer's records for test purposes, because if you damage them you may have to replace them. Check for the following:

1. See that the record changer properly feeds each size of record it handles.

2. See that the pick-up arm lands properly on the outer edge of the record.

3. With the volume control down, place the tone arm near the end of your test record and see that, when the tone arm comes to the end of the record, the automatic tripping action brings the tone arm up and to one side, permits the next record to feed to the turntable, and returns the tone arm in position to play.

4. See whether the automatic tripping mechanism brings the turntable to a stop when no new record is fed to the turntable.

5. Repeat each of these steps for each record size.

4-7. INSTRUCTING THE CUSTOMER

When you are sure that everything is in order, and *before tuning in the radio,* explain to the customer what kind of reception may be expected. It is important that this be done before you or the customer has heard the radio or TV set play in the customer's house. Explain, if you have not already done so, about the possibility of noises from man-made equipment (either inside or outside the house) and from natural causes. In particular, explain the effect such electrical noises will have on weak signals from low-powered or distant stations. Also explain what kind of reception is normal from nearby stations. Explain the differences between day-time and night-time reception and between winter-time and summer-time reception. Explain that certain stations (usually distant ones) may fade in and out and that this is no fault of the receiver or of your installation.

These explanations will build up the customer's confidence in your ability. When you tune in the radio and it performs just as you said it would, the customer knows that you have told him the truth and he feels that you know what you are talking about. On the other hand, if you do not explain to the customer what he can expect when you turn his receiver on, and he discovers noise and other faults in reception, he may think that you did not do a good installation job or that the radio or TV set is defective. Anything you say then will sound like an excuse.

Your next stop is to explain the various features of the set to the customer. Tell him how to turn it on and off, how to control volume, how to adjust the tone control – in fact explain any control that appears on the radio panel. Show the customer how to tune in the radio or TV set so that it is *directly*

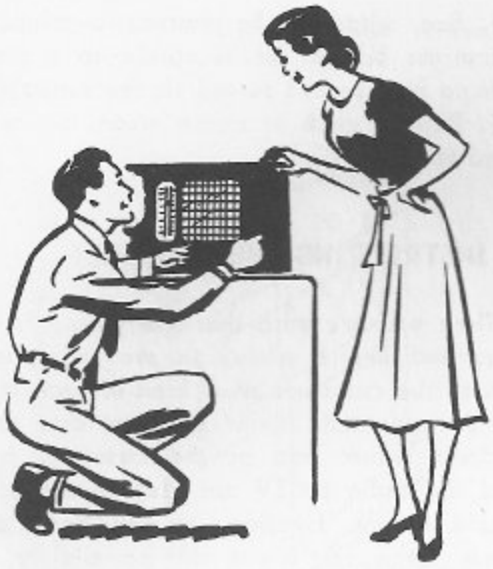


Fig. 4-8

on the station. Show what effect even slight de-tuning has on the increase of noise and distortion. Next, if it is a phono-radio combination, show the customer:

1. How to switch from radio to phono operation
2. How to adjust for record size (if there is any such adjustment)
3. How to adjust the phono stylus (needle) for the type of record to be played
4. How to start the first record playing
5. How to stop the record player temporarily (as when it is necessary to answer the telephone), and how to stop it when the desired records have been played

Have the customer play each size of record and go through each procedure at least two or three times so that you may be sure he or she knows how to operate it correctly. Be patient, not critical. This is sometimes hard to do, but remember that, for the time being, the customer is employing you and deserves a little respect and consideration. Most of us are "all thumbs" when we try to do something strange and new.

4-8. CLEAN UP AND POLISH UP

Before you leave, make sure to remove any factory dust, fingerprints, or other

Fig. 4-9

similar marks from the cabinet with your polishing cloth. Make sure that there is no dust on the tuning dial, either inside or outside. Naturally, removing dust from the outside of the dial is no particular problem. Removing it from the inside of the dial may require removing the chassis from the cabinet. (Service Practices 9 explains how to go about removing the chassis from the cabinet.)

If the cabinet has some minor scratches or other marks that you can correct, do so. Otherwise, make a note of the defect on your report so that it may be attended to later. (Instructions for touching up, polishing, and repairing the cabinet are given in Service Practices 6.)

Clean up any mess that you may have made. If there are scraps of wire or other waste, ask the customer where you may dispose of them. Check to see that you have all your tools. Have the customer sign your installation card. Politely bid him or her a good-day and be on your way.

4-9. YOU AND THE CUSTOMER

You, as a service representative, can be a good-will builder for the store that employs you. You can do this as you install the equipment in the customer's home. To be

Fig. 4-10

sure, the customer must have already felt some good will toward the store, because he purchased the equipment that you have been assigned to install. One of your jobs on the installation is *to keep the equipment sold*. If the salesman or dealer has made an exaggerated statement about the set, you may have to overcome it.

So, in some ways, yours is a harder task than the salesman or dealer performed in making the sale. But remember that if the sale had not been made, you would not be there to install the set. So everybody plays a part. When it comes to the installation, it's up to you to keep that equipment sold and to keep the customer.

If the customer likes the way that you work and behave yourself in his home, and if he likes the way the equipment works after you are through, you have helped to keep the customer's good-will for your firm and have helped to ensure future sales to the customer, his friends, and his family.

Not all customers are reasonable or easy to get along with. Sometimes you have to be extra careful in your efforts to please one. One of the largest service organizations in the world, has put together a list of DO'S and DON'TS to guide their installers and technicians when they are in a customer's home. Of course, it's very easy for you to stop reading right here and to say to yourself, "This is just a lot of advice, and who wants advice?" But, consider this: These rules were really put together by servicemen themselves, as a result of many years of experience in dealing with customers in their homes. Even if you have an urge to skip this part and go to the movies instead, just remember that these rules are the kind of down-to-earth things that you are paying for in this course. So, you might as well run through the list — it's not long — and see what it says:

DO'S

1. When on the job, be careful of your personal appearance. Always have a clean shave, clean clothes, hair neatly combed, and clean hands and fingernails. Look your best and you will feel your best; but what's more, you will also look good to the customer.

2. When you knock at the customer's door or ring the bell and there is no immediate answer, don't be impatient; give the customer a chance to answer. Don't pound at the door as if you were the sheriff with a dispossess notice. At some time or other, you may have been on the phone or in the bath or shower when the bell rang, and you couldn't get to the door in an instant. If there is no answer within a minute, ring or knock again. If, after a few minutes, you cannot get an answer to your knock, then you are entitled to leave a "Not at Home Card". These are cards that most service organizations leave when they find no one at home.

3. If the customer answers the door, greet him or her politely, identify yourself, and state your business.

4. Do not enter the home unless a member of the family is with you. Do not enter the house even when the customer has left a key with a neighbor to admit you. Leave a "Not at Home Card".

5. Be careful of your rubbers, raincoat, and so forth. If possible, leave them outside. Make sure that your shoes are not muddy or otherwise soiled when you enter the customer's home.

6. If it is necessary to use the customer's phone for business purposes, ask for permission first. If there is any charge for the call, make sure that the charge is reversed or pay for the call before you leave.

7. Use a drop cloth on which to place your tools. Never place tools on the customer's polished floor, rugs, or furniture.

8. Be careful of the customer's property. Do not move any furniture around without permission, and be sure your hands are clean when you do.

Fig. 4-11

9. At all times, be careful when using a soldering iron in a customer's home. It is very easy to burn holes in rugs and furniture. Keep your soldering iron on a special stand on your drop cloth. Some men keep a small sheet of asbestos under the iron stand.

Fig. 4-12

DON'TS

1. Do not smoke on the job. If you keep to this rule, you will never be sorry.

2. Do not accept an alcoholic drink while on the job. Be courteous in your refusal. Naturally, it's equally good sense not to drink between calls. The smell of liquor on your breath may do much to lose the customer's confidence in you and your work.

Fig. 4-13

3. Don't forget your promises or appointments. Keep them — on time. Don't make promises you can't keep.

4. Don't interrupt the customer, even when he's wrong. Do your best to get the facts across to him, but remember — he's paying the bill. Above all, don't argue with him!

5. Don't criticize the customer's choice of radio, phono-radio combination, or, for that matter, his choice of anything. You may be right in what you think, but keep it to yourself.

6. Don't act like a "big shot". If the customer asks questions, even questions that you think are silly or stupid, answer them politely and to the best of your ability.

We can sum up by saying that the main purpose of any call to the customer's house is to help the customer and to keep him sold. When a new situation comes up and you don't know exactly what to do, ask yourself, "What is the courteous and the proper thing to do?" If you have any doubts, think before you go ahead.